Logic, Argumentation & Reasoning 23

Shahid Rahman
Matthias Armgardt
Hans Christian Nordtveit Kvernenes *Editors*

New Developments in Legal Reasoning and Logic

From Ancient Law to Modern Legal Systems

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Preface

The use of logical tools for establishing legal certainty has a long and important history, both in the development of legal theory and in shaping inferential and epistemological analyses of legal reasoning. Current historical studies of interactions between logic and legal reasoning often highlight the development of Roman legal scholars' logical schemes and principles, and Leibniz's thorough analyses of legal concepts. Roman jurists made use of logical instruments as process formulae built upon logical connectives, and, in particular, upon different forms of implication. Leibniz, on the other hand, analysed legal concepts as presumptions, conditional rights, and deontic modalities; and his analyses continue to play a major role in theoretical understanding and legal practice to this day, in both the continental frame of Civil Law and the American and British frame of Common Law.

Parallel to these developments, however, and often neglected in modern studies, were the Islamic and Judaic traditions of jurisprudence. Developed throughout the vast East-West span of territory cradling Islamic and Judaic thought, these traditions provided analyses and frameworks for legal reasoning and argumentation that often transcended or significantly preceded those originating in contemporaneous European legal thought. Moreover, they prefigured contemporary perspectives of both Civil and Common Law. With respect to Civil Law, they prefigured an emphasis on hermeneutical, inferential, and dialectical tasks for identifying the norms governing legal reasoning, instrumental to which is pondering the legal relevance of particular cases as instantiating these general norms. And with respect to Common Law, they prefigured an emphasis on deciding the legal status of particular cases, instrumental to which is identifying the legal norm that establishes the bridge to a precedent case.

This context shapes the present volume's main objective; namely, to bring together systematic and historical studies, from different fields, which treat the relational developments between logic, law, and legal reasoning. More precisely, the project is animated by the idea that the study of legal reasoning demands a high level of interdisciplinarity, calling not only for an integration of computer science's recent, breathtaking, technical developments into philosophical studies, but for research wherein historical, logical and philosophical approaches include

the insights of various non-European jurisprudential traditions too often neglected in contemporary work on the interface of deontic logic, argumentation theory, and law.

This project originated in the workshop *Logic, Law, and Legal Reasoning*, which took place as part of the *6th World Congress and School on Universal Logic (Unilog 2018)*, organized in Vichy, France. The workshop gathered logicians and legal theorists from such different fields as philosophy, computer science, law, mathematics, linguistics, and Arabic and Islamic studies, launching a rich, multi-disciplinary discussion on various topics related to the present volume's subject. This volume includes not only some of those workshop participants, but other researchers who are among the finest experts in their fields.

Scholars with similar interests here meet and share the particular insights inherited from their own academic, disciplinary traditions, thus shaping the three-part structure of our volume. Part I, *Historic Roots*, includes five articles on aspects of the Roman, Islamic, and Jewish traditions of legal reasoning. Part II, *Contemporary Law*, includes six articles which study the establishment of legal certainty in the contemporary contexts of International Law and the Civil and Common Law traditions. Part III, *Deontic Logic, Legal Reasoning, Normativity* includes six articles which apply formal notions from deontic logic to legal reasoning in order to provide terminological analyses, or to solve problems that occur within the logic of norms.

Part I, *Historic Roots*, opens with Geoffrey Samuel's *What is it to have Knowledge of Roman Legal Methods and Reasoning?*. Providing an account of certain aspects of Roman legal reasoning, the author highlights its casuistic nature and the emergence of legal positions from factual examples and practical problems, continuing on to show how the concepts and categories of Roman legal methods are still with us today. The following article is closely connected; Markus Winker's *The Use of Logic for Creating Fact Patterns in Roman Legal Writings* studies how logical, mathematical, and abstract thinking play a predominant role in establishing the facts underlying the combination of simple and complex legal cases, by considering a particular passage (Jul.D.35,2,87) in the *Digest* attributed to Julian. Shifting to the Islamic tradition, Mohammad Ardeshir and Fatemeh Nabavi's *A Logical Framework for The Islamic Law* provides an action-based deontic logical system, including a new aspect—stemming from the Islamic legal system—for the notion of obligation. Describing a method of reasoning found in the Ithnā ʿAsharī (Twelver) Shīī school of Islamic law, the authors continue on to prove the soundness and completeness of the new deontic system they call **IDDL**. Next, Walter Edward Young's *The Formal Evolution of Islamic Juridical Dialectic* provides a glimpse of Islamic juristic dialectic at three developmental stages, with a series of vignettes portraying dialectical argument in action. Along the way, the author identifies key features, asserts a critically formative role for the core objections of "intra-doctrinal inconsistency" and "counter-indication," and underscores dialectical disputation's powerful dynamic in shaping Islamic legal and dialectical theory. The fifth and final article of Part I is Joseph E. David's *Independent Reasoning in the Law–the Jewish Tradition*, which discusses the emergence of legal reasoning within Jewish Law as

a form of reasoning independent of other modes (such as logical and hermeneutical reasoning), although, in previous periods, legal reasoning had amounted to the hermeneutical analysis of scriptural texts.

Part II, *Contemporary Law*, opens with Hális Alves do Nascimento França's *Rethinking Interpretative Arguments*, in which the author applies general principles of Textual Discourse Analysis to the interpretations of legal provisions. Describing the overlap between text linguistics and the categorization of legal arguments, the author concludes by explaining how linguistic arguments function as a gateway to all argument types, focusing in particular on commitments in Multilateral Environmental Agreements, and the use of argumentation structures as descriptive tools for analysing statutory meaning. The second article, *A Logic for the Interpretation of Private International Law*, by Alessandra Malerba, Antonino Rotolo and Guido Governatori, extends a logical framework which models reasoning across different legal systems. The authors explain how this framework may be used to analyse the interpretative interactions that occur in private international law when various legal systems are involved, introducing meta-rules for reasoning with interpretive canons. Next, Matthias Armgardt's *A Formal Model for Analogies in Civil Law Reasoning* brings focus to the use of analogies, providing an overview of the concept of analogy in Civil Law systems, discussing different theories, and introducing a new model. This model—based on Alchourrón's significant theory for arguments *a fortiori* and *a pari*—not only includes the requirements for analogical reasoning, but also explains how the balancing of interests can be implemented. The author also provides a new category of analogical arguments, *a simile*, and concludes by applying the model to two concrete examples of analogical reasoning in European Civil Law. Following this, Hans Christian Nordtveit Kvernenes' *Approaching an Analysis of Reasoning by Analogy* utilises Per Martin-Löf's constructive type-theoretical framework to provide a formalisation of analogical reasoning with heteronomous imperatives. This article—linked to the studies on analogy and parallel reasoning—explains how the formalisation of deontic imperatives, together with a notion of conditional obligations, can be used to describe analogical reasoning. It closes by using the formalisation to describe *Adams v. New Jersey Steamboat co*., a well-known example in the literature on analogy. The fifth article, *Elements for a Dialogical Approach on Parallel Reasoning: A Case Study of Spanish Civil Law,* by Maria Dolors Martínez-Cazalla, Tania Menéndez-Martín, Shahid Rahman, and Hans Christian Nordtveit Kvernenes, illustrates—in a case study taken from Spanish Civil Law—the use of parallel reasoning in a dialogical framework, where the intertwining of suitable cooperative and competitive moves structures the legal interpretation of the notions at stake. The sixth and final article of Part II is Douglas Lind's *Abductive Inference in Legal Reasoning: Resolving the Procedural Effect of Res Ipsa Loquitur*, which references C. S. Pierce's notion of abductive inference in the law, with particular regard to the formation of legal concepts. The author deploys this notion of abduction to explain the procedural effect of the common law tort maxim *res ipsa loquitur*, 'the thing speaks for itself.' Despite its widespread use (after the English Court of the Exchequer introduced it in *Byrne v. Boadle* and *Scott v. London and St. Katherine Docks Co.*), this maxim remains highly controversial,

as its procedural effect is seemingly to authorize a burden-shifting presumption of negligence. The author explains how abduction is a suitable form for legal reasoning, clarifies how the English Court of the Exchequer's reasoning process in the mentioned cases can be understood by reference to abductive inferences, and establishes how the procedural effect of *res ipsa loquitur* can be solved by recognizing abduction as the underlying process of inference.

Part III, *Deontic Logic, Legal Reasoning, Normativity* opens with Federico L. G. Faroldi's *Common Law Precedent and The Logic of Reasons*, which provides a justification-based model for the concept of reason in the precedential constraints of Common Law. This model is a response to John Horty's reasons-as-defaults model, describing precedential constraints by both reasons and explicit rules. The author shows how reasons are not assumed to be propositions, and how explicit rules can come in different forms: some are simple, while some are iterated. Following this, Stef Frijters, Joke Meheus, and Frederik Van De Putte's *Reasoning with Rules and Rights: Term-Modal Deontic Logic* introduces a new logic for representing general deontic statements. The authors introduce a first-order logic named **TMDL** (Term-Modal Deontic Logic), wherein deontic operators are indexed with terms of the language. Quantification is then possible not only over objects in the domain, but also over the deontic operators themselves, giving the system properties often associated with second-order systems. The authors discuss how **TMDL** constitutes a suitable logical framework for precisely representing legal rules and legal arguments underlying legal justification, and recognizing such arguments as logically valid. They conclude by demonstrating how **TMDL** can be employed in representing different deontic statements. The third article, *Dyadic Deontic Logic in HOL: Faithful Embedding and Meta-Theoretical Experiments*, by Christoph Benzmüller, Ali Farjami, and Xavier Parent, addresses the issue of automated reasoning for the logical framework DDL (Dyadic Deontic Logic). The authors provide a sound, consistent, semantical embedding of DDL, enabling the mechanisation and automation of DDL on computers; this is part of a larger project, LogiKEy, which develops a general reasoning infrastructure for deontic formalisms. Following this, Jaromir Savelka and Kevin Ashley's *On the Role of Past Treatment of Terms from Written Laws in Legal Reasoning* examines the effect that imprecise language has on the interpretation of written laws, concluding that the analysis of the term's past treatment is indispensable for the establishment of legal certainty. The authors elaborate on certain pitfalls and inefficiencies, illustrating the discussion with an example displaying the complexity of legal interpretation. Next, Juliele Maria Sievers' *Jørgensen's Dilemma in the interface between Legal Positivism and the Natural Law tradition* investigates how Jørgensen's dilemma, the problem of using imperatives in logical inferences, can be solved in the positivistic and the naturalistic traditions of law. The author provides a historical account of natural law and legal positivism, an explanation of how the notion of practical syllogism leads us directly to what is now known as Jørgensen's dilemma, and an argument that Kelsen's solution to the dilemma holds in the field of law, but is not—contrary to Kelsen's view—justifiable in the moral field. Part III closes with Max Urchs' *Coping with inconsistencies in legal reasoning*, which develops new foundations

for dealing with contradictions in legal discourse. The author shows how to utilise Stanisław Jaśkowski's discussive logic D2 in order to provide a methodological basis for legal reasoning. Instead of attempting to avoid any contradiction in the logical formalisation, one might represent these contradictions in the formal system and bring the analysis close to the actual practice of legal disputes, with disagreements and differences.

With the authors of the present volume providing such multi-perspectival interfaces, the editors feel confident they will not only help to fill a gap in our current understanding of the structural dynamics and historic evolution of legal reasoning, but prompt new explorations in some of the more prominent forms of reasoning shaping our society's normative systems.

Lille, France — Shahid Rahman

Hamburg, Germany — Matthias Armgardt

Lille, France — Hans Christian Nordtveit Kvernenes

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